

Validation of an adaptation of the ICPS framework for classifying adverse events

Thommesen, Jacob; Mikkelsen, Kim Lyngby; Siemsen, Inger Margrete; Andersen, Henning Boje

Publication date:
2011

[Link back to DTU Orbit](#)

Citation (APA):

Thommesen, J., Mikkelsen, K. L., Siemsen, I. M., & Andersen, H. B. (2011). Validation of an adaptation of the ICPS framework for classifying adverse events. Paper presented at 3rd International Conference on Healthcare Systems Ergonomics and Patient Safety (HEPS), Oviedo, Spain.

DTU Library

Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

VALIDATION OF AN ADAPTATION OF THE ICPS FRAMEWORK FOR CLASSIFYING ADVERSE EVENTS

Jacob Thommesen¹, Kim Lyngby Mikkelsen², Inger Margrete D. Siemsen¹, Henning B. Andersen¹

¹Technical University of Denmark, Management Engineering, Kgs. Lyngby, Denmark, ²National Board of Health, Copenhagen, Denmark

1. Introduction

The Danish National Board of Health has adapted the World Health Organization's International Classification for Patient Safety (ICPS) for classifying incidents reported to the national Danish Patient Safety Database (DPSD). Originally launched in January 2004, this was the first nationwide, mandatory and non-punitive incident reporting scheme in healthcare, and was explicitly defined to support learning from incidents. The number of reports received by the system has grown from 5,000 in 2004 to 34,000 in 2010. The update of the Danish system will include reporting not only from hospital staff, but also from the primary sector, clinics and nursing homes, and, later, patients and their relatives.

In this paper we review some characteristics of the Danish incident reporting system and considerations before and following a validation of a pilot version in 2010.

2. Current characteristics of the Danish national reporting system

Incident reports are submitted by healthcare staff, typically by someone involved in the incident. While a report may be submitted anonymously, most are submitted and dealt with confidentially (i.e., name and identity of the reporter is known to the local risk managers). This provides the local risk manager with the opportunity for talking face-to-face with the reporting healthcare staff member, possibly eliciting more information about the incident. A report contains, besides demographic and administrative data, a free-text description of the incident in three text fields: *description*, *consequences*, *suggested recommendations*. When the incident has been handled locally, it is then anonymized and submitted to the DPSD including a classification of the incident(s) it contains into a mandatory and perhaps a detailed optional part of ICPS.

Most reports received by the DPSD contain relatively short narratives (typically about 50-200 words) and they sometimes do not contain enough information to allow identification of specific root causes or latent conditions [1]. Severe or potentially severe incidents are examined by an investigation committee, using some causal analysis method or some variant of root cause analysis (RCA). These incidents are also reported to the national database after investigations, and such reports necessarily will contain more information about contributing factors (and recommendations for interventions). However, under current practice the full and detailed analysis reports will typically not be shared, since analyses are carried out under condition of confidentiality.

3. Using an incident reporting system to improve safety

An incident reporting system that maintains a properly structured database of incident reports can be used to improve safety in different ways: descriptive statistical analysis of frequencies, dissemination of lessons learned, and analysis of multiple reports of "similar" incidents - sometimes called "aggregate analysis".

Statistical information about the frequency of specific types of problems or failures and their co-occurrence is of only limited value, as it is well-known that only a small part of actual incidents are reported, and the distribution of types of incidents that are reported may contain unknown biases. Nevertheless, this information can be used to prioritize resources and focus on, for example, selected high-frequency failure types.

When an incident occurs, investigators may wish to consult reports of similar incidents to explore information about causes and perhaps interventions: What has been done to avoid repetition of this type of accident? What is the experience from and the results of any evaluation of the intervention? While some recommendations may be validated and may eventually become national guidelines, others may be more specific to local conditions, and other healthcare institutions will have to consider adaptation more carefully. This is only possible for those incidents where an investigation was carried out, and not for short reports.

Aggregate analysis of similar incidents involves the retrieval of multiple reports of similar incidents for the purpose of investigating patterns of possible causal factors. There is a long and well-established tradition in aviation human factors for performing this type of analysis, when analysts retrieve anonymized reports from a database- for instance, from the confidential ASRS (Aviation Safety Reporting System) in order to study similar safety problems (runway incursions, take-off incidents, pilot fatigue etc.) [2]. The DPSD has similarly been supplying data to support the analysis of incidents involving cardiac arrest mishaps [3], infusion pumps [4], patient handoffs [1].

The use of multiple reports can provide a richer picture of various precursors, direct causes and consequences [5;6]. Such analyses may be enriched if retrieval is based on breadth as well as depth: gathering reports of incidents of the same type, but also reports where the selected failure plays a minor role, e.g. as either cause or consequence of another.

This type of analysis differs from RCAs in a number of ways. A classical RCA focuses on an individual adverse event or a set of such events. Such events are generally complex and may involve several different failures each of which being addressed separately during the investigation. An adverse event will often be the result of coincidentally co-occurring different factors, making it difficult to judge the relative importance (frequency) of each failure. RCAs are designed to identify so-called root causes (latent conditions) and use the analysis as a basis for recommendations or interventions. RCA teams are focused on finding root causes, and there is a risk that the root cause identified may depend more on the method of investigation rather than the information gathered. Many resources are spent on RCAs: the analysis is time-consuming, and it may produce recommendations that are "limited to their particular

‘sphere of influence’” as noted by Taitz et al [7;8]; similar misgivings are voiced by Wu et al. [7]. In comparison, an aggregate analysis based on multiple incident reports is focused on a particular type of failure chosen for its general recurrence or criticality (rather than its role in a particular incident). This focus will tend to restrict the scope of the resulting recommendations for intervention and the possibility of monitoring implementation and effects. In principle, an aggregate analysis will be limited to the written narratives contained in the incident reports, having little opportunity to acquire further information via interviews, both because details are forgotten some time after the incident and because anonymity in the incident reporting scheme may make it cumbersome to elicit further information from the healthcare staff involved in the incident. The inclusion of multiple reports is expected to allow a richer picture of various causes and consequences although information in short reports is probably limited to the actual ‘visible’ failures and may not be sufficient to reveal systemic causes or human factors. Furthermore, some incidents may be highly dependent on local conditions and thus difficult to compare.

4. Adapting the ICPS

A taxonomy provides a common vocabulary for comparable incidents, facilitating comparison across both national and regional borders. It also allows the grouping of similar incidents, which enables statistics and retrieval (for comparison and analysis). Nevertheless, it is important that the input phase does not become too cumbersome or time-consuming for risk managers, who receive and classify incident reports.

The previous taxonomy contained nine categories, among which risk managers had to pick one. After adaptation of the ICPS, the taxonomy requires users to pick one or several among a much larger set of non-exclusive incident types. For the mandatory part, users must select one or several among 26 types and, if they pass on to the wider and more detailed optional part, among 100+ incident types. This may make it more time-consuming to classify reports, since risk managers are encouraged to select all relevant categories for each reported incident. On the other hand, the taxonomy will match the reported incidents better and will also support local analysis by providing a standard framework. (At the time of writing, March 2011, experience with the new system is still too scant to allow any conclusions).

Although the taxonomy may be used to capture essential aspects of reported incidents in terms of *incident types*, it is important that narrative text is preserved. Thus, there are relevant aspects of an incident that are not represented by the categories, notably time lines and causal relations between several failures in one incident.

The Danish adaptation of ICPS is mainly based on a single class: *Incident types*. ICPS provides a separate class for *contributing factors*. This concept, however, encompasses different phenomena. 1) Some contributing factors are incidents in their own right, e.g. a communication failure leading to a medication error. 2) Other contributing factors are latent conditions [9] or root causes, such as inadequate procedures or resources, and are therefore not events but “standing conditions” that make the occurrence of adverse events more likely.

This duality is apparent in ICPS, where *organizational* phenomena are represented as both *Incident type* and *Contributing factor* - with similar (though not identical) name and subtypes. For example, communication failures are classified as a contributing (human) factor. But strictly speaking, a communication failure is an incident, not a latent condition - whereas the absence of protocol, say, for transferring information about vital signs may be said to be a latent condition.

In recognition of the fact that a given factor may be regarded as the focal point in one investigation and as a causal precursor in another, the Danish adaptation of ICPS has not implemented a separate class for contributing factors. Users are encouraged to indicate all failures as incident types. Thus, the classification of any given incident will convey information about all failures and factors involved, but not about the temporal and causal priority of events and conditions. The latter are contained in the individual narrative and, when provided, the analysis of the incident.

Some incident types have been expanded to also include systemic factors. In particular, *Resources and organization* covers both occasional failures such as coincidental understaffing or unavailability of relevant procedures, and latent conditions such as inadequate procedures or permanent understaffing. Furthermore, *Documentation* was expanded to include *Communication*, which is often treated as a contributing factor.

A prototype version of the DPSD has been validated, targeting the mandatory part of the system only (26 types of incidents). The validation involved a test of reliability (58 events, 33 raters) and a wider elicitation of usability problems (65 participants) the results of which are described in detail in separate publications [10;11]

References

- 1 Siemsen IMD, Petersen LF, Nielsen J, Østergaard D, Andersen HB. Adverse events in patient handover - Analysis of incident reports and interviews. [submitted] 2011.
- 2 Billings CE. The NASA Aviation Safety Reporting System: Lessons Learned from Voluntary Incident Reporting. 1998 Nov; Conference: *Enhancing Patient Safety and Reducing Errors in Health Care*: The National Patient Safety Foundation; 1999 p. 97-100.
- 3 Andersen PO, Maaløe R, Andersen HB. Critical incidents related to cardiac arrests reported to the Danish Patient Safety Database. *Resuscitation* 2010;81(3):312-6.
- 4 Bjørn B, Garde K, Pedersen BL. Infusionspumper og patientsikkerhed. *Ugeskrift for Læger* 2007 Jan 22;169(4):315-8.
- 5 Duijm NJ, Goossens L. Quantifying the influence of safety management on the reliability of safety barriers. *Journal of Hazardous Materials* 2006;130(3):284-92.
- 6 Ale BJM, Baksteen H, Bellamy LJ, Bloemhof A, Goossens L, Hale A, et al. Quantifying occupational risk: The development of an occupational risk model. *Safety Science* 2008;46(2):176-85.
- 7 Wu AW, Lipshutz AKM, Pronovost PJ. Effectiveness and Efficiency of Root Cause Analysis in Medicine. *JAMA* 2008;299(6).
- 8 Taitz J, Genn K, Brooks V, Ross D, Ryan K, Shumack B, et al. System-wide learning from root cause analysis: a

report from the New South Wales Root Cause Analysis Review Committee. Quality and Safety in Health Care 2010 Dec 1;19(6):1-5.

9 Reason J. Managing the risks of organizational accidents. Ashgate; 1997.

10 Mikkelsen KL, Thommesen J, Andersen HB. Validating the ICPS-based classification of patient incidents in Denmark. [submitted] 2011.

11 Thommesen J, Mikkelsen KL, Andersen HB. Usability evaluation of an adaptation of the WHO classification for patient safety. [submitted] 2011